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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/823,035

04/13/2004

Ryuichi Kanamura

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08/21/2006

SONNENSCHN NATH & ROSENTHAL LLP

P.O. BOX 061080

WACKER DRIVE STATION, SEARS TOWER

CHICAGO, IL 60606-1080

EXAMINER

VU, HUNG K

ART UNIT

PAPER NUMBER

2811

DATE MAILED: 08/21/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/823,035	KANAMURA, RYUICHI	
	Examiner	Art Unit	
	Hung Vu	2811	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 June 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 3-14 is/are pending in the application.
- 4a) Of the above claim(s) 6-14 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 3-5 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 3 – 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Owada et al. (PN 6,949,830, of record) in view of Shimooka et al. (PN 6,534,870, of record).

Owada et al. discloses, as shown in Figures 5A – 5B, a semiconductor device having a wiring structure, the wiring structure comprising:

a lower buried-wiring layer (12);

an interlayer insulating film (15x) provided on the lower buried-wiring layer;

an inter-wiring insulating film (17,18x,18y) provided on the interlayer insulating film;

and

an upper buried-wiring layer (upper portion of 19) buried in wiring groove provided in the inter-wiring insulating film, the upper buried-wiring layer being electrically connected to the lower buried-wiring layer through contact plug (lower portion of 19) passing through the interlayer insulating film;

wherein the interlayer insulating film is a first carbon-containing silicon oxide film (SiOC film) (15x);

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the inter-wiring insulating film comprises a laminated insulating film including an organic or inorganic low dielectric constant insulating film (17), and a multi-layer second carbon-containing silicon oxide film (18x,18y) provided on the low dielectric constant insulating film and having a plurality of layers with different carbon contents, the carbon content of the top layer (18y) of the second carbon-containing silicon oxide film being lower than that of the first carbon-containing silicon oxide film (15x).

Owada et al. does not disclose the upper buried-wiring layer buried in wiring grooves and being electrically connected to the lower buried-wiring layer through contact plugs. However, Shimooka et al. discloses a wiring structure having an upper buried-wiring layer (59) buried in wiring grooves and being electrically connected to a lower buried-wiring layer (54) through contact plugs (55). Note Figures 9 – 10C of Shimooka et al.. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the wiring structure of Owada et al. having the upper buried-wiring layer buried in wiring grooves and electrically connected to the lower buried-wiring layer through contact plugs, such as taught by Shimooka et al. in order to form a multiple interconnection between the wirings to perform the different functions.

Note that the term “formed by a dual damascene method” is method recitation in a device claimed. “[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the

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prior product was made by a different process.” *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985).

Regarding claim 4, Owada et al. and Shimooka et al. disclose the claimed invention including the semiconductor device as explained in the rejection above. Owada et al. and Shimooka et al. do not disclose the carbon content of the second carbon-containing silicon oxide film. Although Owada et al. and Shimooka et al. do not teach the content of the carbon, as that claimed by Applicants, however, it would have been obvious to one having ordinary skill in the art at the time the invention was made to form the carbon-containing silicon oxide film having a desired content, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Regarding claim 5, Owada et al. and Shimooka et al. disclose the lower buried-wiring layer is buried in an inter-wiring insulating film (52) provided below the interlayer insulating film and comprising an organic insulating film (lower portion of 52) and a carbon-containing silicon oxide film (upper portion of 52) provide on the organic insulating film (Col. 12, lines 47-48).

Response to Arguments

2. Applicant's arguments filed 06/09/06 have been fully considered but they are not persuasive.

It is argued, at page 6 of the Remarks, that Shimooka et al. (the examiner think Applicants mean Owada et al., not Shimooka et al.) does not disclose the carbon content of the top layer of the

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second carbon-containing silicon oxide film should be lower than that of the first carbon-containing silicon oxide film. This argument is not convincing because Owada et al. discloses, as shown in Figures 5A-5B, the carbon content of the top layer (18y) of the second carbon-containing silicon oxide film being lower than that of the first carbon-containing silicon oxide film (15x). Note that layer 18y is CORAL and layer 15x is TORAL, and that the carbon content of CORAL is at least 1% lower than that of the TORAL. Also note claims 4, 9 and 10 of Owada et al..

Conclusion

3. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hung Vu whose telephone number is (571) 272-1666. The examiner can normally be reached on Tuesday to Friday 6:00-4:30.

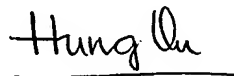
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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie C. Lee can be reached on (571) 272 - 1732. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Vu

August 13, 2006

A handwritten signature in black ink, appearing to read "Hung Vu", written over a horizontal line.

Hung Vu

Primary Examiner